# Request to Archive
## With The National Centers for Environmental Information
## For A dynamically downscaled projection of past and future microclimates
## Provided by Arizona State Univeristy

## 2014-05-13

This information will be used by NCEI to conduct an appraisal and make a decision on the request.

### 1. Who is the primary point of contact for this request?

Ofir Levy

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### 2. Name the organization or group responsible for creating the dataset.

Collaborating researchers (see 27)

### 3. Provide an overview summarizing the scope of data you want to archive. Describe the outputs, data variables, including their measurement resolution and coverage.

Ecological forecasting requires information about the climatic conditions experienced by organisms. Despite impressive methodological and computational advances, however, ecological forecasting still suffers from the poor resolutions of environmental data. Published climatic data comprise relatively few layers of surface climate and suffer from coarse temporal resolution.  Hence, models using these data might underestimate heterogeneity of microclimates and miss ecological and evolutionary consequences of climatic extremes. Moreover, we currently lack predictions about vegetation cover in future environments, a key factor for estimating the spatial heterogeneity of microclimates and hence the capacity for behavioral thermoregulation. Here, we describe the creation of MIC_CLIM_36, a set of microclimate and vegetation data for the past and the future at resolutions of 36 km and 1 h. To create these data, we used a global circulation model (Community Earth System Model) to simulate climates at a resolution of 0.9° latitude and 1.25° longitude. The predictions of this model were bias-corrected using reanalysis data and then scaled to a resolution of 36 km with the Weather Research & Forecasting Model. The output from the second model was used as input for a microclimate model that we derived from the Noah Microphysics Model. Using the Weather Research & Forecasting Model, we also predicted hourly vegetation cover across the downscaling domain. The final dataset includes temperatures and wind speeds for 1980-1999 and 2080-2099 at various heights and soil temperatures at various depths (0 to 198 cm above and below the ground) under five levels of shade (0 to 100% at intervals of 25%). We also provide the percentage of vegetation and the percentage of shade given the angle of the sun. These downscaled data were evaluated using several criteria, each of which shed light on a different aspect of the dataset.

### 4. What is the time period covered by the dataset? (YYYY-MM-DD, YYYY-MM or YYYY)

From 1980-01-01 to 2099-01-01

### 5. Edition or version number(s) of the dataset:

1.0

6. Describe the level to which the data are processed. For example, are these unprocessed raw observations, derived parameters, quality controlled or inter-calibrated data, etc.?

predictions from the Weather Research & Forecasting Model and from our microclimate model.

7. Approximate date when the dataset was or will be released to the public:

2014-06-30

8. Who are the expected users of the archived data? How will the archived data be used?

Scienstists who are interested in high resolution microclimate data at different shade levels, or vegetation cover dynamics under past and future climates. Such as ecologists who desire to study climate change effects on animals.

9. Has the dataset undergone user evaluation and/or an independent review process? Did NCEI participate in design reviews?

We compared hourly predictions of the Weather Research & Forecasting Model (WRF) for 1980 to 1990 with the corresponding data from the NCEP Climate Forecast System Reanalysis (ds093.1). We used several criteria for evaluation, each of which shed light on a different aspect of the data. We limited our evaluation to temperatures and specific humidity at 2 m and wind speeds at 10 m. We compared, seasonal means, thermal extremes, annual frequency of values, and Long-term trends.

We validated our microclimate model by comparing 20 years (1980-1999) of hourly ground temperatures as predicted by the WRF Noah-MP model to those predicted by our microclimate model.

10. Describe the dataset's relationship to other archived datasets, such as earlier versions or related source data. If this is a new version, how does it improve upon the previous version(s)?

11. List the input datasets and ancillary information used to produce the data.

We used a global circulation model (Community Earth System Model) to simulate climates, that we downscaled to 36km using the Weather Research & Forecasting Model. The output from the secon model was used as input to our microclimate model

12. List web pages and other links that provide information on the data.

The information about the data is not included in the output files.

13. List the kinds of documents, metadata and code that are available for archiving. For example, data format specifications, user guides, algorithm documentation, metadata compliant with a standard such as ISO 19115, source code, platform/instrument metadata, data/process flow diagrams, etc.

1. We are about to submit a manuscript that describes the dataset to Ecology (data paper).

14. Indicate the data file format(s).

1. binary

15. Are the data files compressed?

7-zip

16. Provide details on how the files are named and how they are organized (e.g., file_name_pattern_YYYYMM.tar in monthly aggregations).

Each file is a 20-years time-series data for one location. File name template:

MIC_CLIM_36_[climate_scenario(past/future)]_[latitude]_[longitude].7z

17. Explain how to access sample data files and/or a file listing for previewing. If it is not available now, when will it be available?

https://www.dropbox.com/s/h339dv3a036pvxn/MIC_CLIM_36_past_40.904_-113.764.7z

https://www.dropbox.com/s/giu2ttfjbjx2y01/MIC_CLIM_36_future_40.904_-113.764.7z

An R script to open and read these files can be sent upon request

18. What is the total data volume to be submitted?

<u>Historic Data: all historic data or data submitted as a completed collection.</u>

Total Data Volume:     5TB
Number of Data Files:     53698

19. Are later updates, revisions or replacement files anticipated? If so, explain the conditions for submitting these additional data to the archive.

We will update the data if errors will be found by users, or users fedback will suggest adding more variables or layers.

20. Describe the server that will connect to the ingest server at NCEI for submitting the data.

Physical Location:     Austin, Texas, USA
System Name:     Texas Advanced Computing Center
System Owner:     The University of Texas at Austin
Additional Information:

21. What are the possible methods for submitting the data to NCEI? Select all that apply.

1. FTP PULL
2. FTP PUSH

22. Identify how you would like NCEI to distribute the data. Web access support depends on the resources available for the dataset.

1. User interface to order and stage data for download
2. Direct download links

23. Will there be any distribution, usage, or other restrictions that apply to the data in the archive?

No known constraints apply to the data.

24. Discuss the rationale for archiving the dataset and the anticipated benefits. Mention any risks associated with not archiving the dataset at NCEI.

Archiving this dataset will ensure it will not be accidently deleted. Also, the scientific community will have access to kinds of data that may help us tackle climate change problems.

25. Are the data archived at another facility or are there plans to do so? Please explain.

We are exploring options to archive the data at the Texas Advanced Computing Center and at the Data Observation Network for Earth

26. Is there an existing agreement or requirement driving this request to archive? Have you already contacted someone at NCEI?

No

**27. Do you have a data management plan for your data?**

No

**28. Have funds been allocated to archive the data at NCEI?**

No

**29. Identify the affiliated research project, its sponsor, and any project/grant ID as applicable.**

Project: Incorporating Physiological Variation in Mechanistic Range Models for Ecological Forecasting

PIs: Michael Angiletta (Arizona State University), Lauren Buckley (University of North Carolina), and Timothy Keitt (University of Texas-Austin)

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**30. Is there a desired deadline for NCEI to archive and provide access to the data?**

Archive by:               2014-07

Accessible by:

**31. Add any other pertinent information for this request.**

None